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AVIATION OPERATIONAL MEASURES FOR FUEL AND EMISSIONS REDUCTION WORKSHOP

FUEL CELL AIRPORT/AVIATION CHALLENGES AND OPPORTUNITES

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Ottawa, 5-6 November 2002

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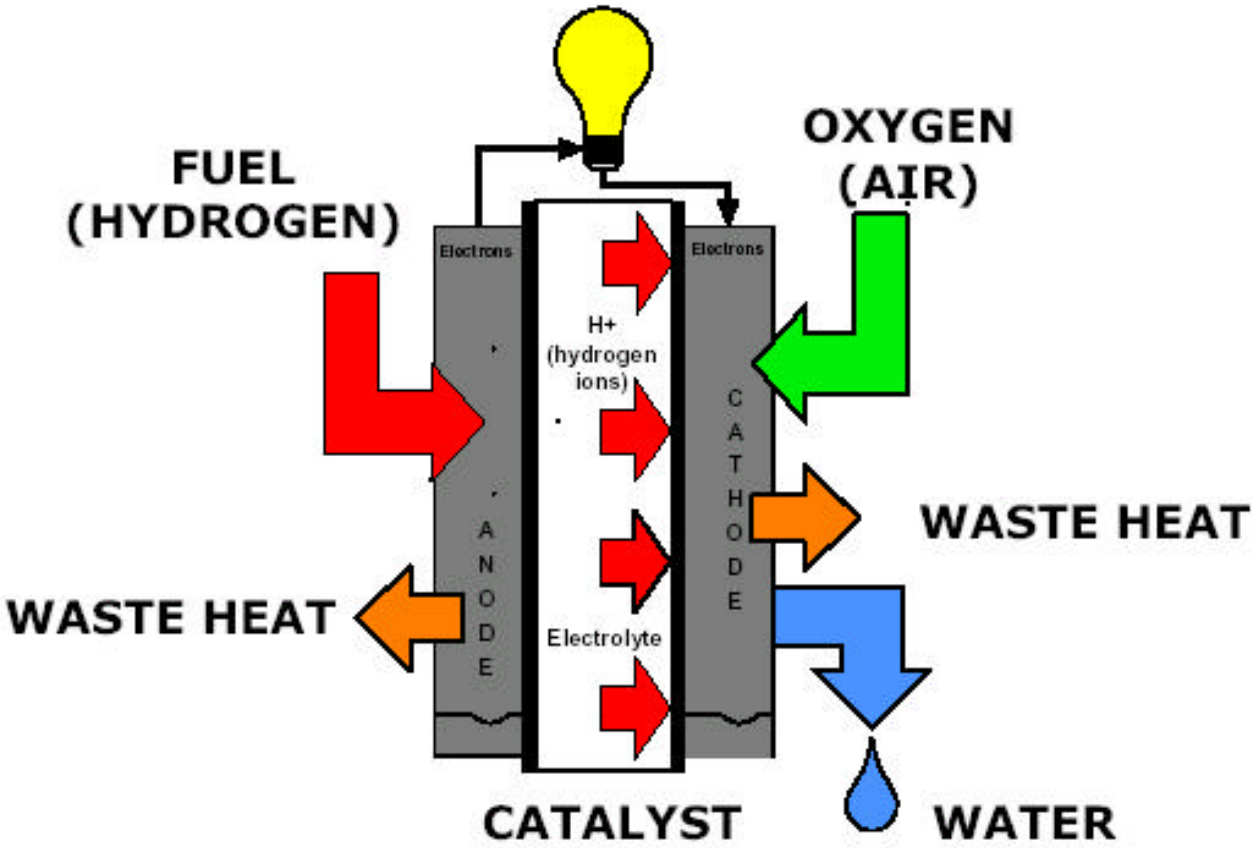
FUEL CELLS PRODUCE ELECTRICITY WITHOUT COMBUSTION BY HARNESSING THE CHEMICAL ENERGY OF HYDROGEN AND OXYGEN



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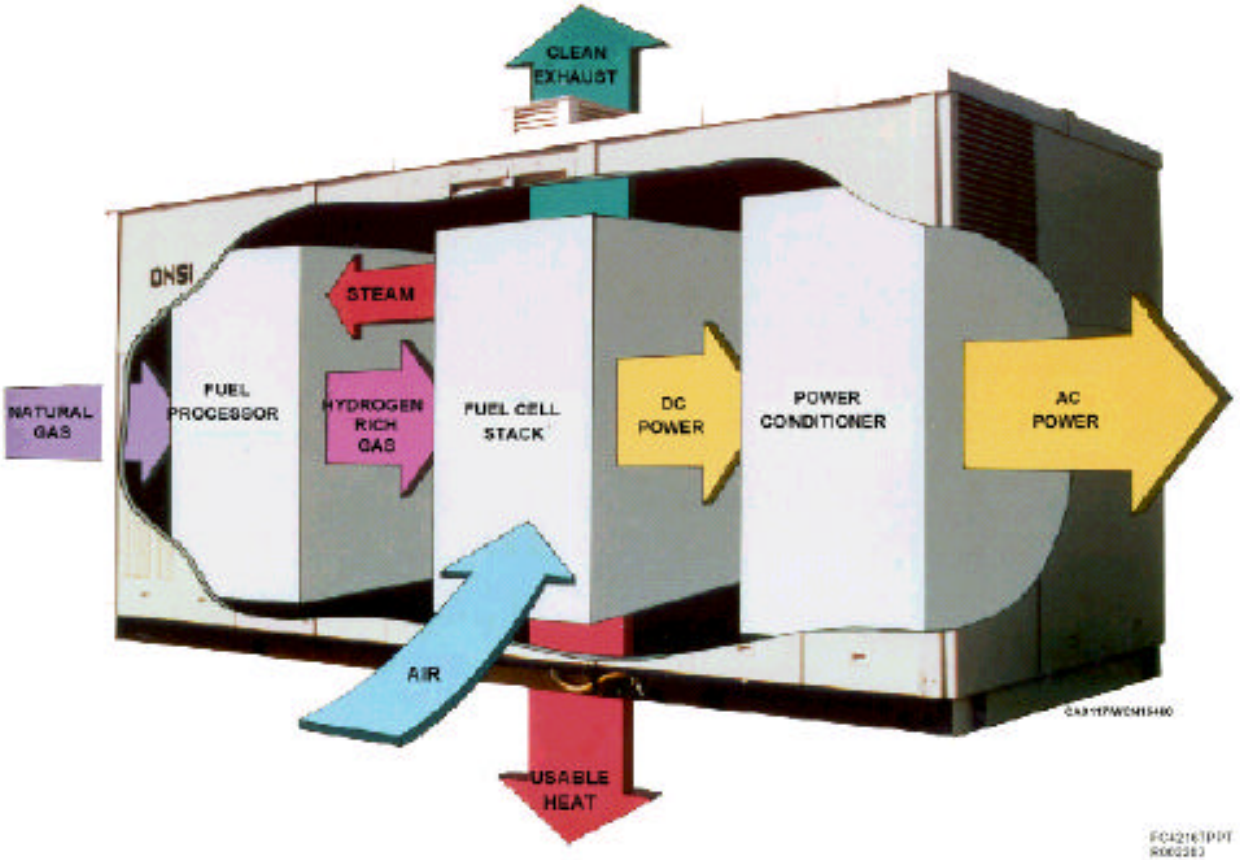
FUEL CELL POWER PLANT



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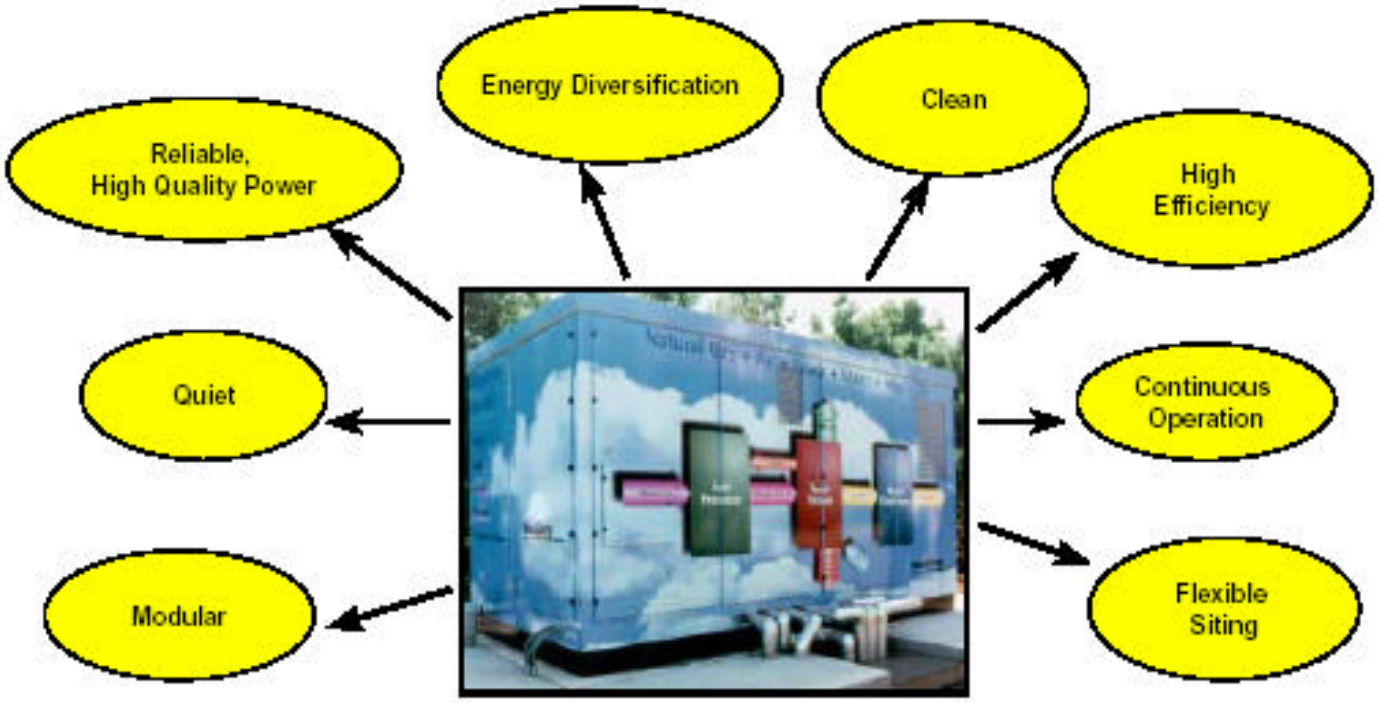
FUEL CELL BENEFITS



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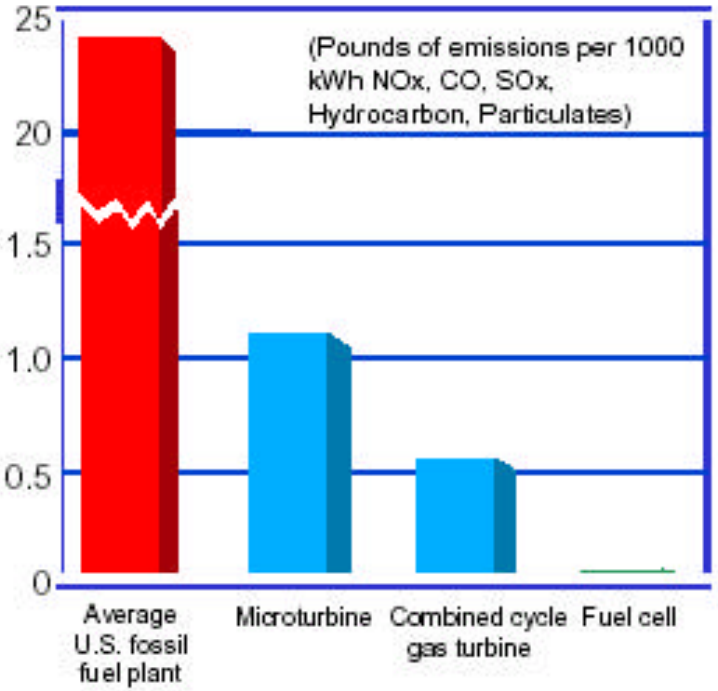
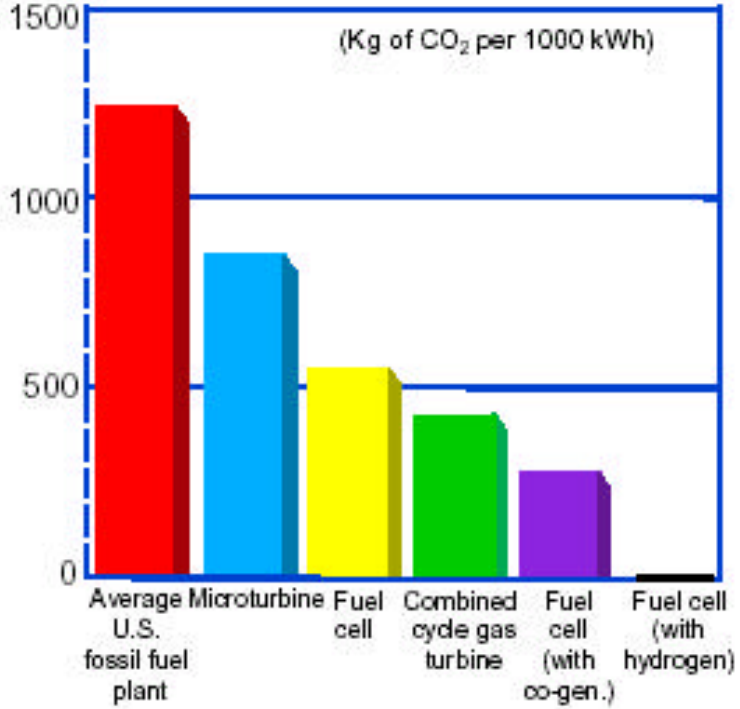
FUEL CELL EMISSIONS

FUEL CELL EMISSIONS



CO2 EMISSIONS



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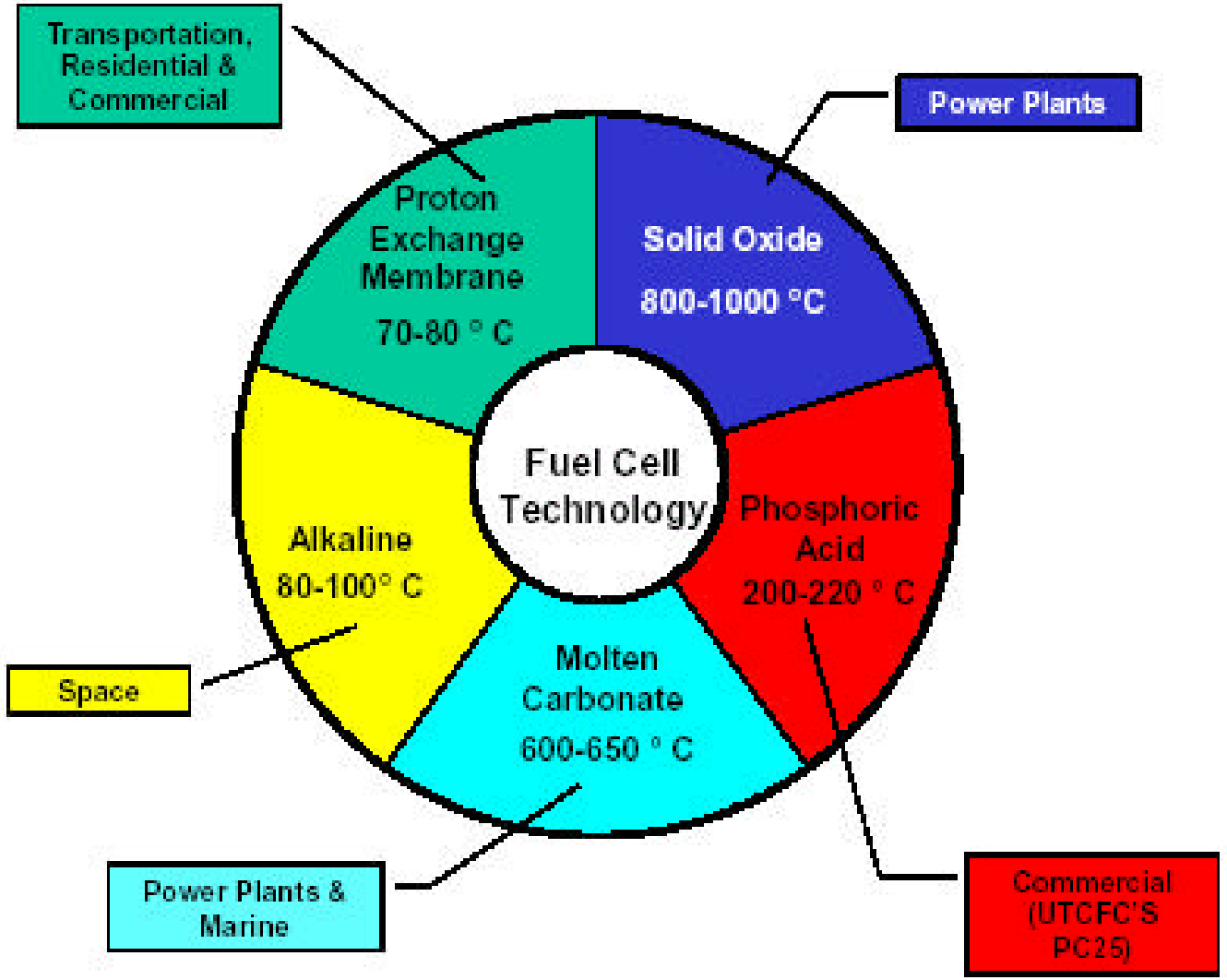
FUEL CELL TECHNOLOGIES



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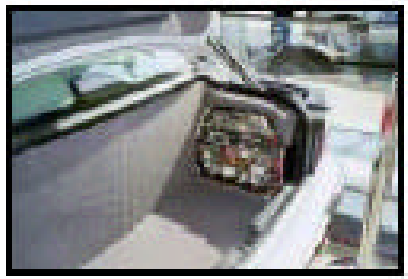
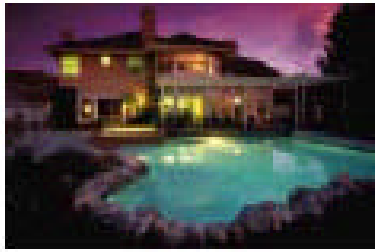
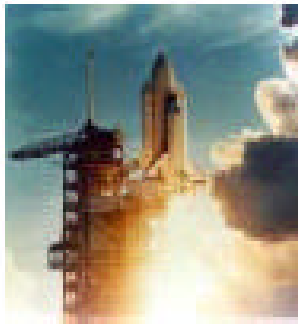
DIVERSE FUEL CELL APPLICATIONS







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NEXT GENERATION FUEL CELL

CHALLENGES

- Reduce Capital Costs
- Address Technical Issues
- Expand Hydrogen Infrastructure
- Remove Regulatory Impediments
- Obtain Public Acceptance

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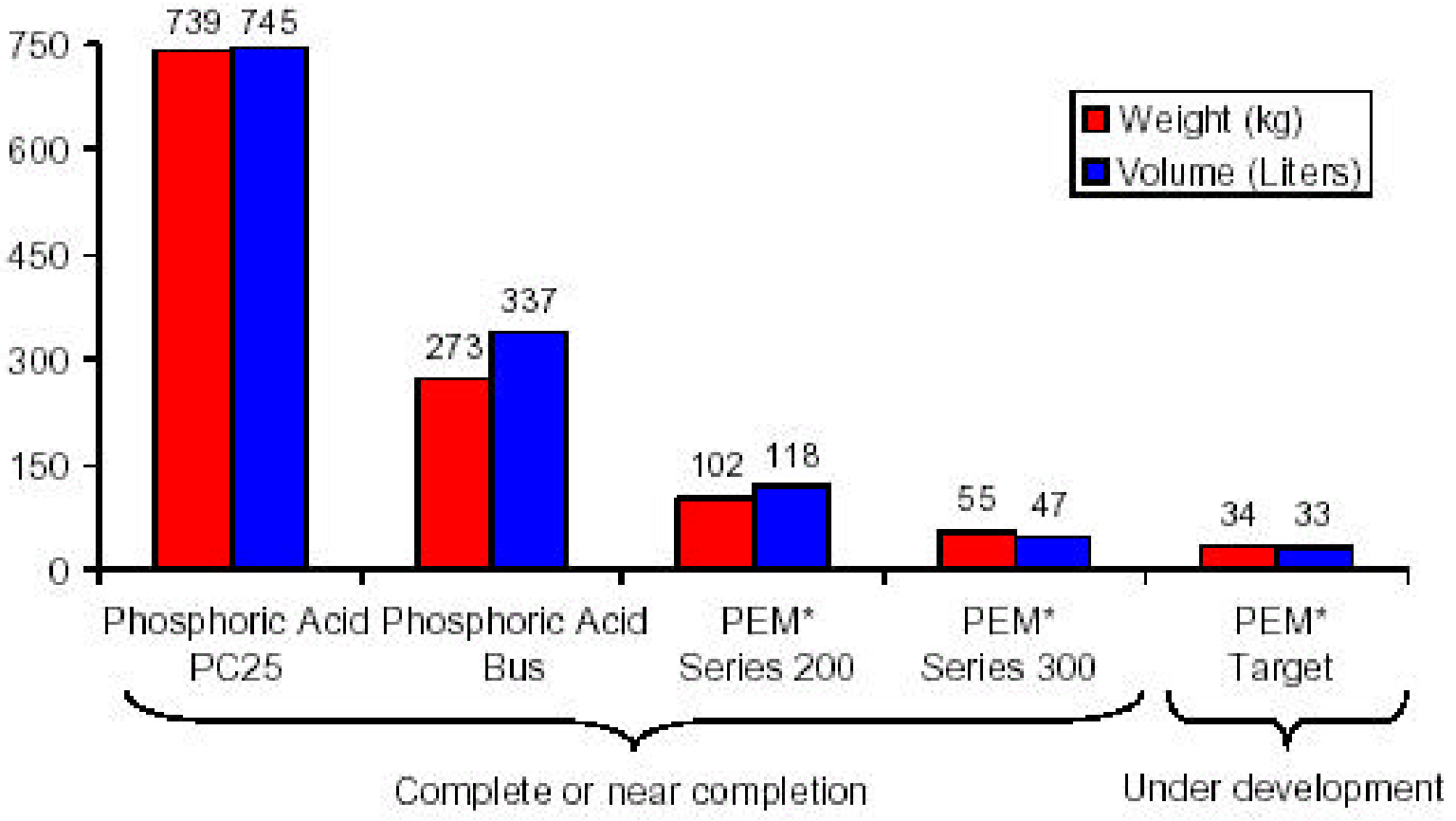
TECHNOLOGY DEVELOPMENT

Stack size comparison – 50kW



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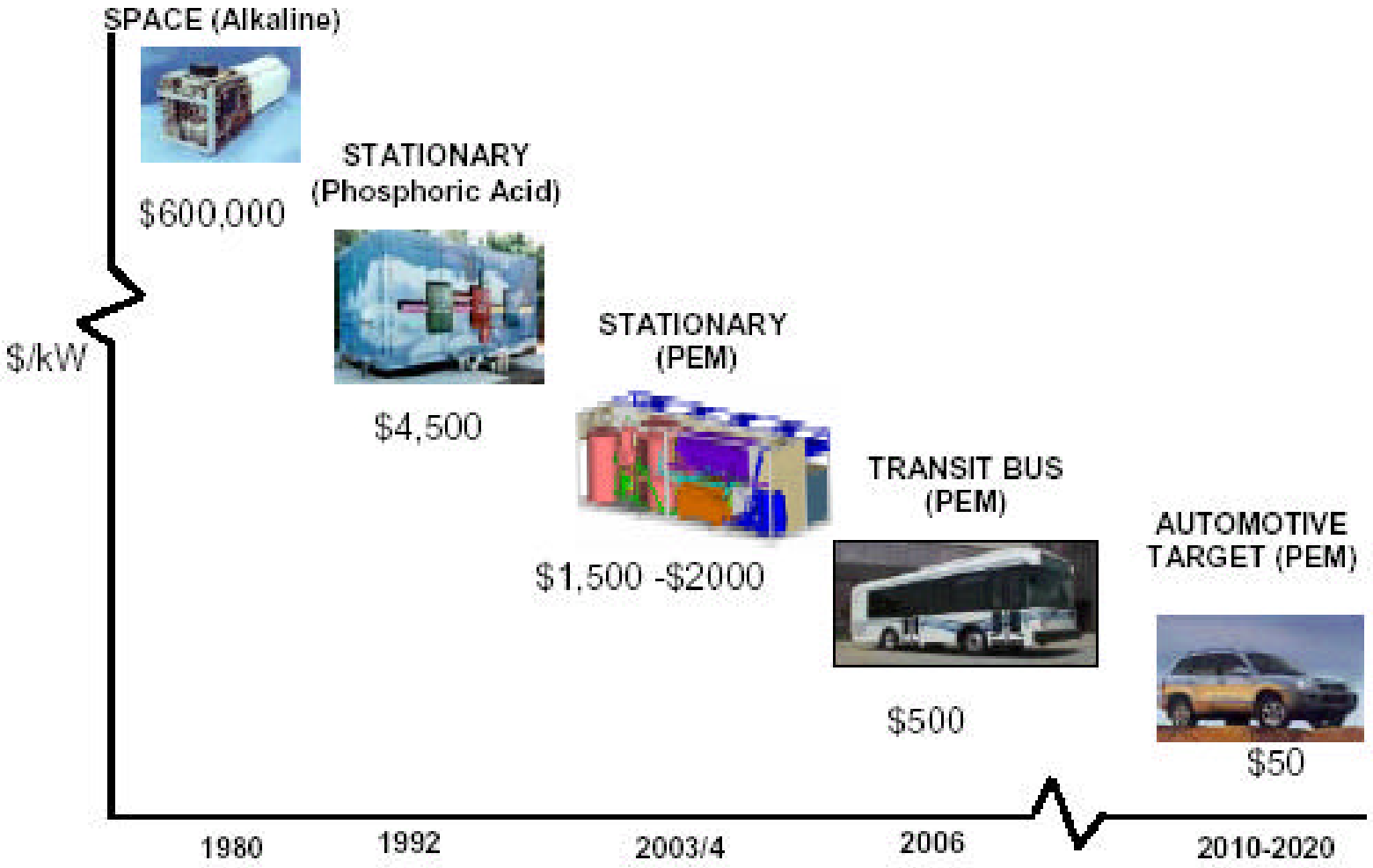
EVOLUTION OF FUEL CELL MARKETS



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POTENTIAL AIRPORT/AVIATION FUEL CELL APPLICATIONS

- Control towers
- Terminal operations
- Shuttle buses
- Personal vehicles
- Ground support equipment (GSE)
- Auxiliary power Units (APUs)
- Manned/unmanned aircraft

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FUEL CELL CHALLENGES FOR GSE/APU APPLICATIONS

- Ground Support Equipment
  - Use of diesel fuel
  - Infrequent duty cycle
  - Harsh operating conditions
- Auxiliary Power Units
  - Not altitude independent
  - Use of aviation fuel
  - Power density requirements
  - Frequent start/stop cycles
  - Certification

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SUMMARY

- Fuel cells offer clean, efficient, reliable, secure, high quality, quiet, flexible source of power for a wide range of power needs
- Fuel cell technology is a reality in niche applications

Transit buses will be next evolutionary step followed by personal autos

- Near term airport applications will focus on stationary and mobile applications such as buses
- Public and private sector working to overcome, cost, technical, infrastructure, regulatory and market acceptance hurdles

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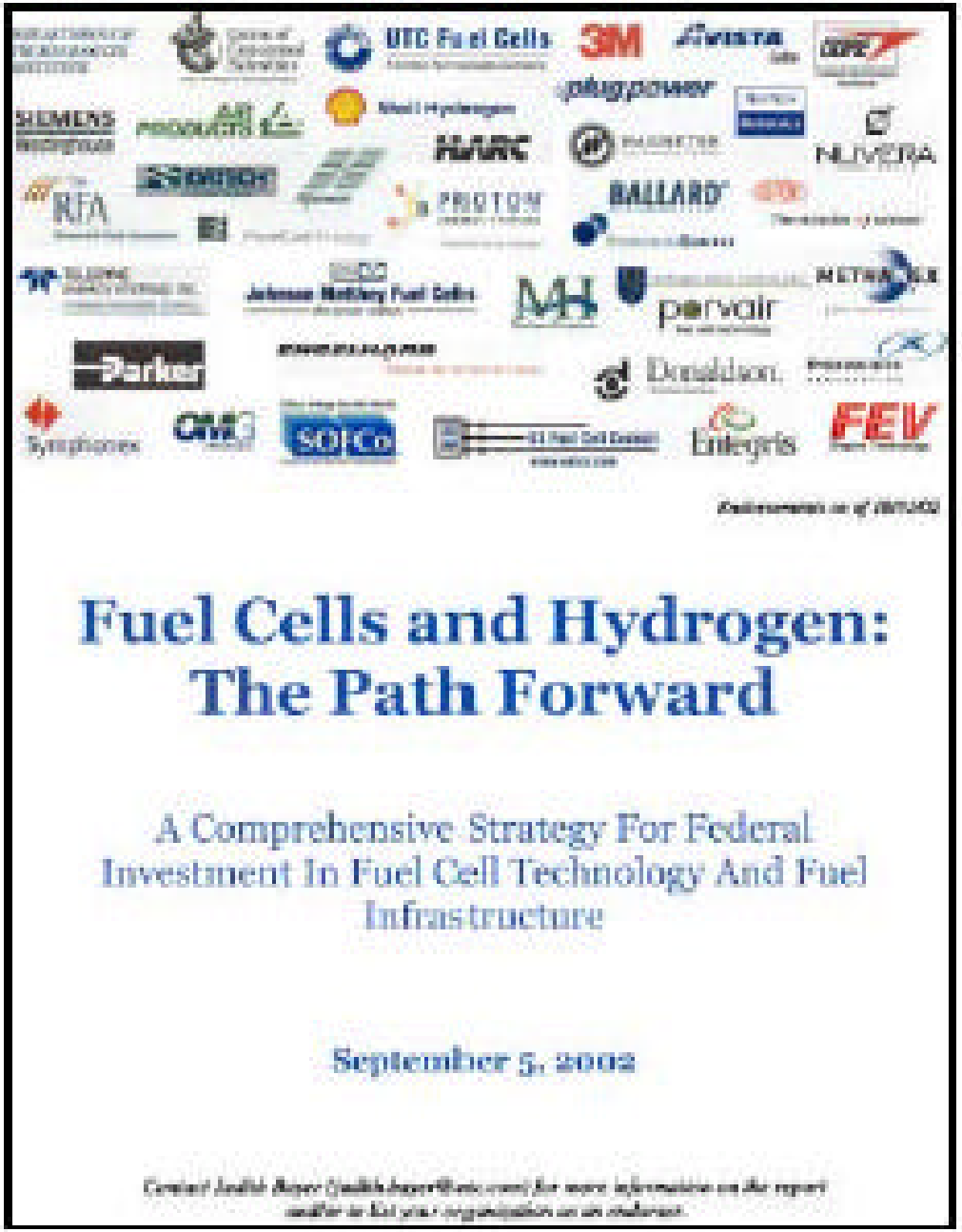

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Thank you !

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